

An
Inaugural Dissertation.
on
Tetanus.

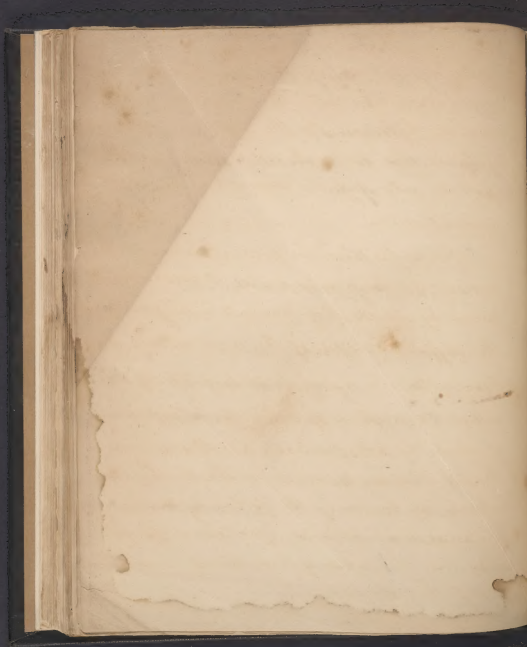
No 2

Submitted to the examination
of the

the
Medical Professors and Trustees.
of the
University of Pennsylvania.

on the day of April 1808
For the degree of Doctor of Medicine
by J^{ts} B. Otto
of Pennsylvania.

Honorary member of the Philadelphia
Medical Society
and member
of the Philadelphia
Linnæan



On Tetanus.

Tetanus, this is a painful disease, and its frequent mortality; called the attention of the earliest physicians. In the ancient works, we find it described, with some accuracy by Hippocrates; who, supposed would be the most general cause.

Since his time, we find it described by various authors, who divide it into several species, by which they mean to distinguish, the different stages, of the same disease; and have allotted a name, to each grade of this disease, expressive of the different position of which the body is liable to be thrown into; by the contraction of certain muscles, which positions are known by the following names. viz Tetanos, Ompnosthonus, Opisthotonos, Pleurosthotonos. &c. The whole of these terms nearly express the same disease.

It is a painful business to be
confronted with the attention of
medical physicians. The various
finds it involves with some accuracy of
practice who suppose would be the most
general cause.

Of course the time, in fact it is almost
impossible without the desire of not
specify, by which they mean to distinguish
the different stages of the same disease
has added a name to each grade of the
disease, especially of the different stages
of which the body is liable to the various
the condition of certain organs, and of
others are known by the following names.
These symptoms are distinguished through the
course of the whole of their lives, many
of the same nature.

All late writers concur in opinion that tetanus changes with paroxysms; sometimes affecting one part of the body with violent contractions and rigidity of the muscles on the back; then again at short intervals, the opposite muscles are contracted. With those alternate remissions & intermissions, the same person may be said to have tetanus, Opisthotonos, Emprosthotonos all in the space of a short time.

Morely relates 2 interesting cases which corroborates this opinion.

Case 1. Once, as I entered the hut of a negro belonging to Mr. The Bond, in Kingston in Jamaica, the man had got up in one of the remissions, in an opisthotonos, & was standing on the floor, leaning against his bed. On my speaking to him, he was suddenly seized with violent contractions of all the muscles, which curved him like a bow, & sprang up from the ground and fell pitched

backward, with his head foremost nearly through
from the place where he stood, amongst some earthen
pots that were in the corner of his hut. By the fall
he cut his head very much, & divided the temporal
artery. He died within two hours.

Case 2^d In which every part of a womans body
was convulsed, or rendered stiff & rigid by turns.
Sometimes her head was turned to the right side,
then to the left, then backward as in the opisthotonus
-nus, then forwards as in the Comprothotonus?

This disease may and does occasionally, occur
in every climate that we are acquainted with.
Yet it occurs most frequent in the Tropical climates,
and most commonly, in the warmest seasons of
such climates: So much so indeed; that it has been
considered endemic in such climates. Hillery
Observes that the arthritic, suffered pretty much
in a dry cool season; and several persons were seized
with opisthotonos & tetany from seemingly very slight
causes. x [Hillery page 88.]

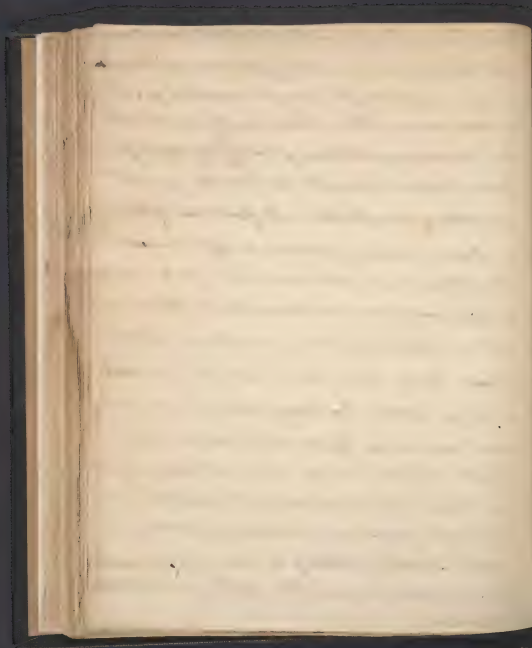
Mostly likewise remarks tetanus, is endemical amongs children in many places betwix the tropics; but by no means, as some have supposed, depending on situations near the sea, or exposed to the winds; when it attack them, it is generally on the eight or ninth, and seldom after the twelfth or ~~fourteenth~~ fourteenth day, from their birth²².

Though the causes do, upon occasion, affect all sorts of persons, they seem however, to attack persons of middle age more frequent than the older or younger, the male sex more frequent than the females, the robust & vigorous more frequent than the weaker²³.

Mostly remarks the negroes, are more subject to tetanus than the whites. This he supposes, is owing to an increase of irritability & diminished sensibility. He likewise observes the algerines & moracans, are much distinguished for privation of sensibility as the negroes.

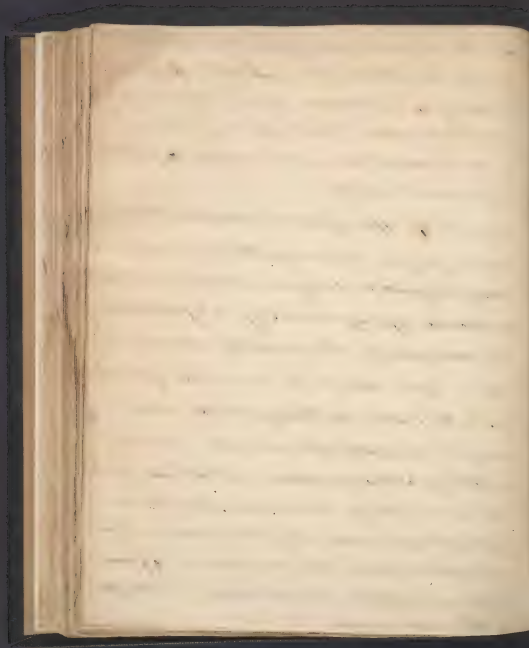
Mostly these animals are found in the
mountainous districts in many places where the
climate is not so warm, as there has appeared
to be some relation even to the appearance
of the birds when it comes to the mountains
in the north and return after the winter
months from the south, from this fact
though the cause is more obvious, often
the birds of passage they have been to other
parts of the world of more frequent than the
birds of passage the birds of more frequent
than the former the birds of more frequent
and then the birds
though we are the birds in more frequent to
than the birds the birds of more frequent to
one of the birds of more frequent to
the birds of more frequent to
and for the birds of more frequent to

Here, I cannot agree with the illustrious man,
that this increase irritability, and diminished sensi-
-bility is natural, but may be acquired from
certain causes. Which I shall briefly enumerate.
We have many instances of Debility destroying
pain. hence, criminals can bear the greatest
punishments inflicted with fortitude; of this
we have a striking instance, a case mentioned
by Priestley; a man who was sentenced for some crime
to suffer punishment at stated periods. He bore it
with uncommon fortitude, and almost without
a groan. Being asked how he bore it, he answered
he always fastened 2 or 3 days before his punish-
-ment came on. & Again; Do we not see delicate
females? who from disease have not taken much
punishment, bear operations of the most painful
kind with composure; and scarcely uttering a
groan. Further, bleeding so much recommended
in perturbation to relax the rigidityth of the os uteri.



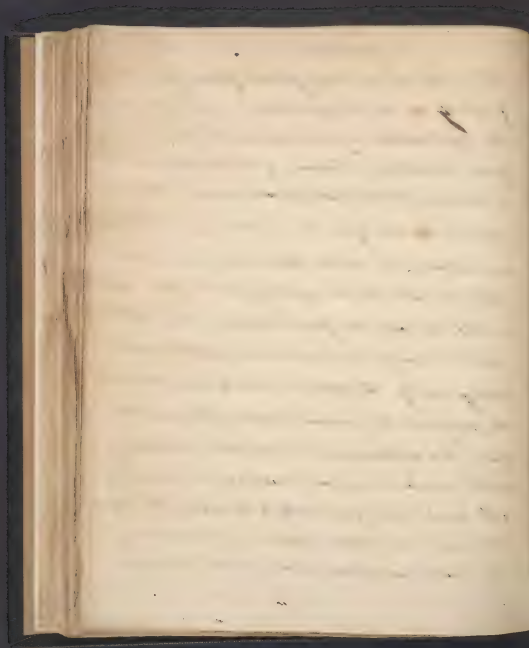
and the adjacent parts; from its debilitating agency, also allivates pain. Lastly; do we not always give Laudanum before performing a painful operation? this I suppose, is given with a view to palliate pain, which it does by producing indirect debility.

May not the sparing diet, in addition to heat, labour, fatigue &c. to which the negroes are generally confined to, bring on debility? which those mentioned. Dyscrasy sensibility in a great measure and consequently, the irritability will accumulate in equal ratio, to the diminution of sensibility. To this I attribute their fortitude under painful operations, and not to the natural irritability as Massey supposes; but to their preternatural irritability. These causes I conceive are sufficient explanation; why? the negroes are more subject to this disease than the whites. Why, from better circumstances, are not exposed to many of the above causes.

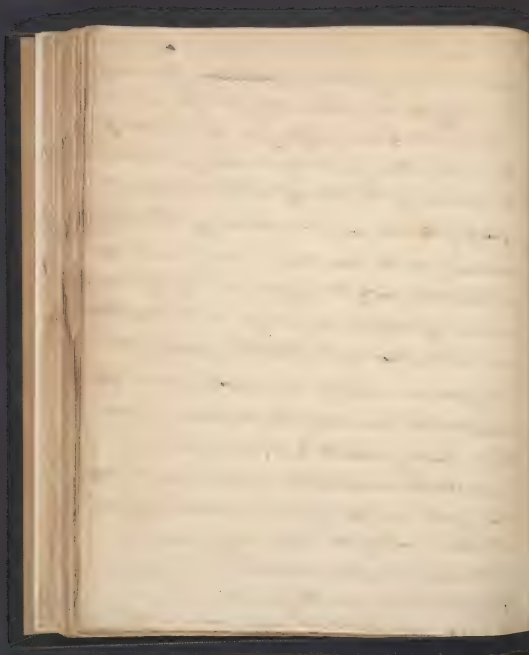


Symptoms.

When this disease is brought on from cold, it generally makes its appearance; a few days after the applications of such colds. But when arising from punctures or lacerations of the Nerves, muscles, or tendons, it does not appear so soon. It usually not wait till after the tenth day; but there are instances, in which 6 or 8 weeks have elapsed, after the last related exciting cause. Often do we see tetanus come on from wounds, where the patient is doing to all appearance well the wound healing kindly; the pain much diminished in the part; and the general health of the patient good. When suddenly an acute pain, extending up the limbs when from wounds of the arms or legs, to the neck, back, & frequently to the root of the tongue. This pain is succeeded by spasm of the muscles of those parts, constituting what is called tetanus.



The disease sometimes comes on suddenly to a violent degree, but more generally it ~~approaches~~ approaches by slow degrees to its violent state. In this case it comes on with a sense of stiffness in the back part of the neck, which gradually increasing, renders the motions of the head difficult & painful. As the rigidity of the neck comes on increasing, there is commonly at the same time a sense of uneasiness felt about the root of the tongue, which by degrees, becomes difficulty of swallowing, and at length an entire interruption of it. While the rigidity of the neck goes on increasing, there arises a pain, often violent at the lower end of the sternum, and from thence shooting into the back. When this pain arises, all the muscles of the neck, and particularly those of the back part of it, are immediately affected with spasm, pulling the head strongly backwards. At the same time, the muscles that pull up the lower jaw, which upon the first approaches of the disease are affected with some spasmodic



are now generally affected with more violent spasm, and sets the teeth so closely together that they do not admit of the smallest opening. When the disease has advanced thus far, the pain at the bottom of the sternum returns very frequently; and with it the spasms of the hind neck & lower jaw, are renewed with violence & much pain. As the disease thus proceeds, a greater number of muscles comes to be affected with spasms. After those of the neck, those along the whole of the spine become affected, bending the trunk of the body. During the whole of the disease, the abdominal muscles are violently affected with spasm, so the belly is strongly retracted, and feels hard like a board. At length the flexors of the head & trunk become so strongly affected as to balance the extensors, and to keep the head & trunk straight, & rigidly extended, incapable of being moved in any way; and it is to this state the term of tetanus has been strictly applied."



At the height of the disease, every organ of voluntary motion seems to be affected, & ~~amongst~~ the rest, the muscles of the face. The forehead is drawn up into furrows, the eyes, sometimes distorted, are commonly rigid, & immovable in their sockets; the nose is drawn up, and the whole countenance expresses the most violent grinning. Under these universal spasms a violent convulsion commonly comes on, and puts an end to life. — "These spasms, are every where attended with most violent pains. The utmost violence of spasm is however, not constant, but, after subsisting for a minute or two, the muscles admit of some remission of their contraction, altho' of no such relaxation as can allow the action of their antagonists."

"This remission of contraction gives also some remission of pain; but neither is of long duration. From time to time, the violent contractions & pains are renewed sometimes every ten or fifteen minutes, and that after without any evident exciting cause. But, such exciting causes frequently occur, for almost any other



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"motion, as attempting a change of position, endeavoring to swallow, & even to speak, sometimes gives occasions to a renewal of the spasms over the whole body."

"Although fever is not a constant attendant of this disease, especially when arising from lacerations of nerves; yet in those cases, ^{proceeding} ~~producing~~ from cold, a fever sometimes has supervened, and is said to have been attended with inflammatory ~~symptoms~~ ^{symptoms}."

"Blood has been often drawn in this disease, but never exhibits any inflammatory crust; and all accounts seem to agree, that blood drawn seems to be of a coarser texture than ordinary, and that it does not coagulate in the usual manner."

"In this disease the head is seldom affected with delirium or even confusion of thought, till the last stage of it when, by the up^{er}ted shocks of a violent distemper, every function of the system is greatly disordered."

"Tetanus often proves fatal before the fourth day, and when a patient has passed this period, he may be supposed to be in greater safety, & in general the disease



is the safer the longer it has continued: It is however,
to be particularly observed, that even for many days
after the fourth, the disease continues to be dangerous;
& even after some considerable abatement of its
force, it is ready to recur again with its former vi-
olence & danger. It never admits of any sudden, or
whole is rather critical solution; but always recedes
by degrees only, & it is often very long before the
whole of the symptoms disappear.*

3. Predisposing causes.

These are all such as induce debility either directly,
or indirectly,
or particularly of the muscles.

1. Cold, this has long been considered as an active
agent in producing debility.

2. Debilitating passions of fear, Grief, & Dispair.

3. Want of sufficient aliment. All these act directly
in inducing this debility.


4. Aetia, this is universally acknowledged, to be the predisposing

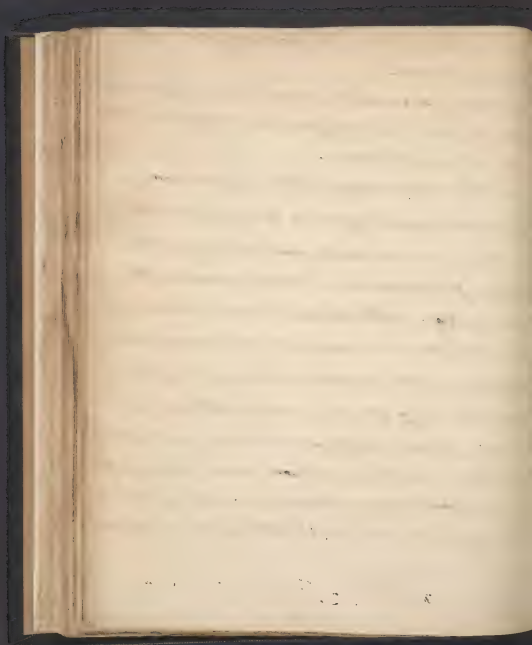
cause of tetanus. Hence the frequency of it in the tropical climates.

5. Unusual labour and exercise: hence we find tetanus more frequent occurring; from wounds received in battle, than at any other time.

To these causes may be added excess in venery, and indeed every thing which tends to induce debility.

From what has already been said, infer that debility from abstraction or action, constitutes the predisposition of this disease. However, this debility does not appear to be universal, but is more particularly seated in the muscles, which may be inferred from their being almost exclusively the seat of the disease, for were debility equal in every part of the body, we would have universal disease; as many of the occasional causes of tetanus, are such as frequently inducing fever when preceded this requisite predisposition.





Of the exciting causes.

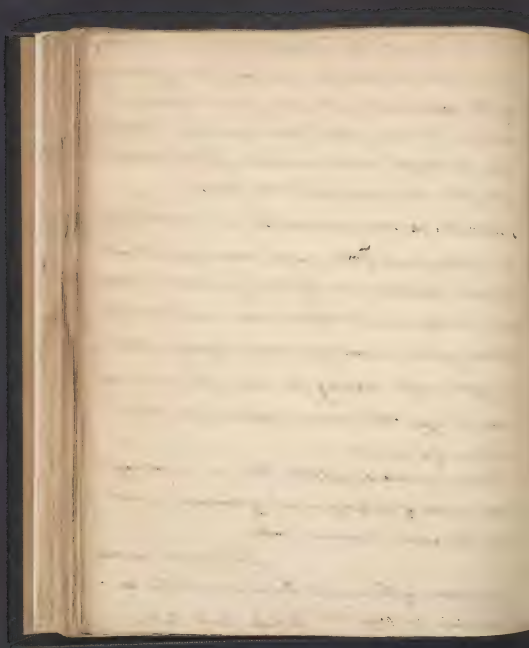
The partial division of a nerve or tendon, was believed by the ancients, to be the most frequent cause of this disease. But since those times experience & observation has taught us that superficial wounds, on any part of the body, may excite the disease.

Cold, this in some instances has been known to be the exciting cause of this disease, more especially after exposure to intense heat. Of this Sydenham mentions many instances. — Boerhaave relates an instance of its having been induced by a person's sleeping without a night cap after shaving his head. The cool air more certainly brings on this disease, if applied to the body in the form of a current.

Certain poisonous vegetables. These are several cases upon record of its being induced by hemlock dropwort and the *Datura stramonium* &c.

Lastly certain emotions and passions of the mind. "Terror brought it on a

small work vol 1 page 252 (A. Rush & Boston Let.)



brewer in the city. He had been previously debilitated by great labour, in warm weather. I have heard of its having been induced in a man, by agitation of mind, occasioned by seeing a girl trod upon a nail. Fear excited it in a soldier who knelt down to be shot. upon being pardoned he was unable to rise, from a sudden attack of tetanus.

Of the pathology.

From the symptoms and many of the causes, are naturally led to suppose the disease to exist in the muscles, but in what manner the cause act appears difficult to ascertain. Mosely seems to suppose that it is a spasm seated only in the muscles or subservient to the animal functions. And thus whether original ~~original~~, or symptomatical; Is caused by irritating impressions, which depending alike upon irritating impressions, made upon any one part of the body, producing morbid excitement,



or disease in another. It is immaterial whether the impression be made upon the intestines by worms, upon the ears by ungrateful noise, upon the mind by a strong emotion, or upon the sole of the foot by a nail; it is alike communicated to the muscles, which from their previous debility & irritability are thrown into commotion by it.

In yielding to the impressions of irritants, they follow their contractions the ~~order~~ order of their predisposing debility. The muscles which move the lower jaw are affected more early, and more obstinately than any of the other external muscles of the body, only because they are more constantly in a relaxed or idle state.¹

Trophylaxis.

Few diseases, which can with more certainty be prevented, in its forming state than tetanus; and to this period we should be particular attention.

Thus from all its causes, has nearly the same
premonitory symptoms. These are stiffness, in
neck, a disposition to bend forward, in order to
relieve a pain in the back, costiveness, a pain
~~in the back~~ about the region of the stomach, or
a disposition to start in sleep. In this feeble state
of the disease, an emetic, a strong dose of calomel,
or opium, the warm bath, or a few doses of bark,
have often prevented it being completely
formed. When it has arisen from a wound, detac-
ting it if small or heales, and afterward inflam-
ming it, by applying to it turpentine com-
mon salt, corrosive sublimate, or Spanish flies,
have in many heinous instances been attended
with salutary effects."§

Cure.

The indications of cure are 1st to loosen or obstruct
the morbid excitement of the muscles, which may be



accomplish by Bloodletting, 2 Emetics. & 3 purgatives.
& 2^d after sufficient depletion to remove or overcome
the disease by tonics remedies. These are opium,
2 Bark. 3 wine. 1 oil of Amber. 5 Cold & hot baths among
each of which I shall briefly mention. — — —

Bloodletting I find, has been mentioned as early
as Hippocrates, & has been found very beneficial
in tetanus, arising from cold; which according
to Willerss observation, are generally attended with
phlogistic Diathesis. It likewise has been found
useful when arising from wounds attended with
inflammatory symptoms.

Emetics & Cathartics.

These have been employed in some cases with
success; Especially. "When the disease is the effect
of fever, the same remedies should be given as
are employed in the cure of that fever. Thus one
unlocked the jaw of a woman, who was seized at
the same time with a remitting fever by emetics"



They also prove ~~unserviceable~~ serviceable, when acid substances or poisons are taken into the stomach. Purges may be used with a view to evacuate the alimentary canal, thereby expelling the acid feces and sometimes worms which cause irritation. — — — — — Opium.

According to Bhalmeers opium is universally necessary; and it must be given with a bold hand, and at short intervals of time between the doses; untill the end is answered. Mosely observes it has been given to the extent of one Drachm every ^{three} two or four hours, together for several days without inducing sleep. But sleep, in those large doses, do we often find it ~~ineffectual~~ in removing this disease.

Bark and Wine.

Bush mentions one case, in which the opium had failed in large and repeated doses, when it was immediately dismised; and gave large quantities



of bark and wine, to the amount of two or three
ounces of the former, and from a bottle to three
pints of the latter in a day; in a few hours I was
delighted with their effect: His spasms & pains were
less frequent & violent, & he slept for several hours,
which he had not done for several days and nights
before. With the same indication in view, I
applied a blister between his shoulders, and rub-
bed in two or three ounces of mercurial ointment
upon the outside of his throat. He continued to
mend gradually under the operation of these
medicines, so that in ten days he was out of dan-
ger. Altho^{tho} the spasm continued in his wounded
foot for several weeks afterward.

Ardent spirits.

A quack in New England has lately cured blindness
by giving in such large quantities as to produce
intoxication &c

¹ And Solomon. † memoirs of the Med. Society of London vol. 8. p. 110
1710



Oil of Amber.

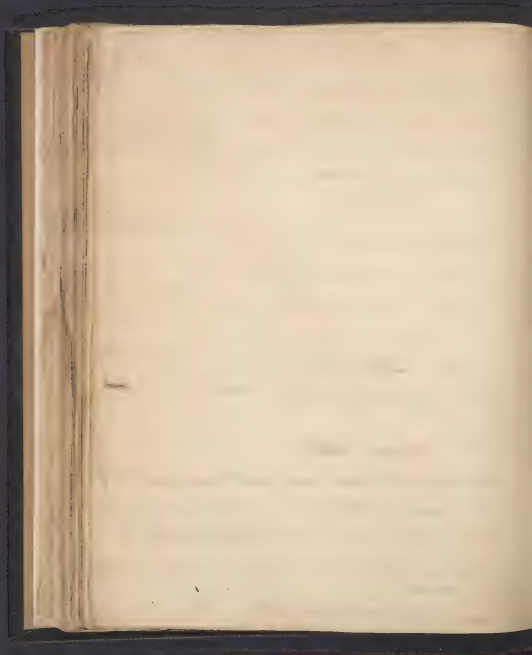
This from its action on the muscular system is much recommended by many author in the cure of tetanus; and should be given in considerable doses and repeated.

Cold baths.

This has in many instances performed cures, we find it mentioned by Hippocrates, and since his time is recommended by many authors. In one of two cases in which I have used it with success, the ~~the~~ patient's jaw opened in a few minutes after the effusion of a single bucket upon her ~~and~~ body.

Warm baths.

This has often been used with success, Mostly cured a Captain Thompson of a tetanus, only by putting him into a warm bath, three times a day; and given him small doses of laudanum.



um & antimonial wine. This medicine kept up a
great perspiration, caused by the bath; which
I judged to be the most proper method of treating
a tetanus as his was from obstructed perspiration,
from the night air. &

Mercury.

This has been employed with a view to salivate
by many practitioners; and when this could be
accomplish, the disease generally terminated
favorable. Dr Young mentions a case, which
he cured by means of this medicine, after opium
wine, Bark, & ol of Amber had failed. Dr Rush
also said he saw a case which was cured in the
hospital by this medicine. But unfortunately the
Nigritism cannot be generally excited early enough
to be of service.

Seaton's.

Have been often seen used with advantage. Desportes
says, he cured a negro woman, by making a seaton.

& Morels on tropical climates Discours page 403

Dr. Desportes. Opusc. 2. Plac. General. 1764.

was a certain one. The subject of
just punishment, comes by the law, and
justice is in the most proper manner of doing
a better in his own substance, punishment
from the right one.
Hence.

This has been explained with a view to a
very many questions, and when this was a
recognition, the same principle of punishment
is shown. The same principle of punishment
is shown by means of the same, the same
is shown, and a very much different
the same is in a very much different
subject of the same, the same
the same is in a very much different
subject of the same, the same
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in her neck, with an hot needle.

Blisters.

Byrdesstone commend Blisters in high
terms in this disease. He says he never saw it
prove fatal, even where they only produced a
redness on the skin! x

